Land-use changes and the endemism-rich avifauna of São Tomé

Ricardo Faustino de Lima[1], Martin Dallimer[2], Phil Atkinson[3] and Jos Barlow[1]

1 – LEC, Lancaster University; 2 – Department of Animal and Plant Sciences, University of Sheffield; 3 – British Trust for Ornithology.

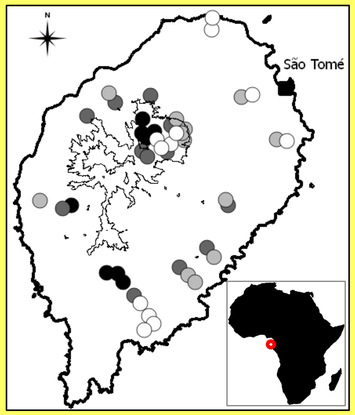
Ricardo F. de Lima

(3rd year PhD student)

Lancaster Environment Centre

e-mail: r.delima@lancaster.ac.uk

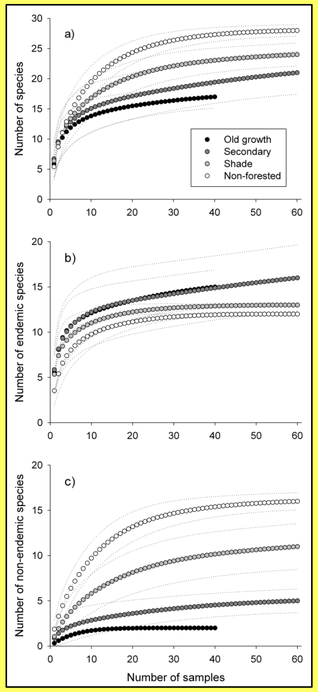
Student Conference on Conservation Science, Cambridge, 22 – 24 March 2011



The island of São Tomé

- The island of São Tomé (Gulf of Guinea) is one of the most important areas for bird conservation in Africa, hosting twenty endemic species and eight endemic subspecies.
- Forests still cover 60% of the island, but the expansion and intensification of agroforestry is threatening their unique biodiversity.
- We did point counts along transects to record the abundance of all bird species along a land-use intensification gradient and assess how the avifaunal community is responding to this ongoing threat.

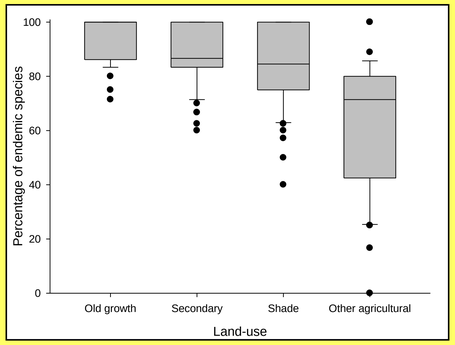
São Tomé Island map. Sampling locations are represented by dots, with colours indicating the different land-uses (least to most intensive): black – old-growth forest; dark grey – secondary forest; light grey – shade plantation; white – non-forested. Solid lines are the 0, 800 and 1400m altitudinal contours. The location of the capital town, São Tomé, is given by a black square. The red dot in the inset shows the island's location in Africa. The island is 854km^2.



Species accumulation curves. Each line was based on the abundance observed in each point count. Dotted lines show the 95% confidence intervals.

Species richness

- There was an increase of the species richness in more intensive land-uses.
- This pattern was attributable to the strong increase in the number of non-endemic species outside the forests.
- The endemic species, which are of higher conservation interest, showed the tendency to decrease in more intensive land-uses.



Proportion of endemic species across land-uses. The box plots are showing the 10th, 25th, 50th(median), 75th and 90th percentiles, while the dots represent outliers. The data refers to the observed species richness in each point count.

Dwarf Olive Ibis (*Bostrychia bocagei*).

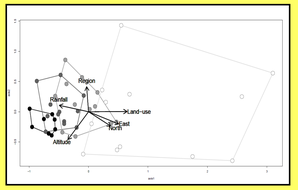
São Tomé Grosbeak (*Serinus concolor*).

São Tomé Fiscal (*Lanius newtoni*).

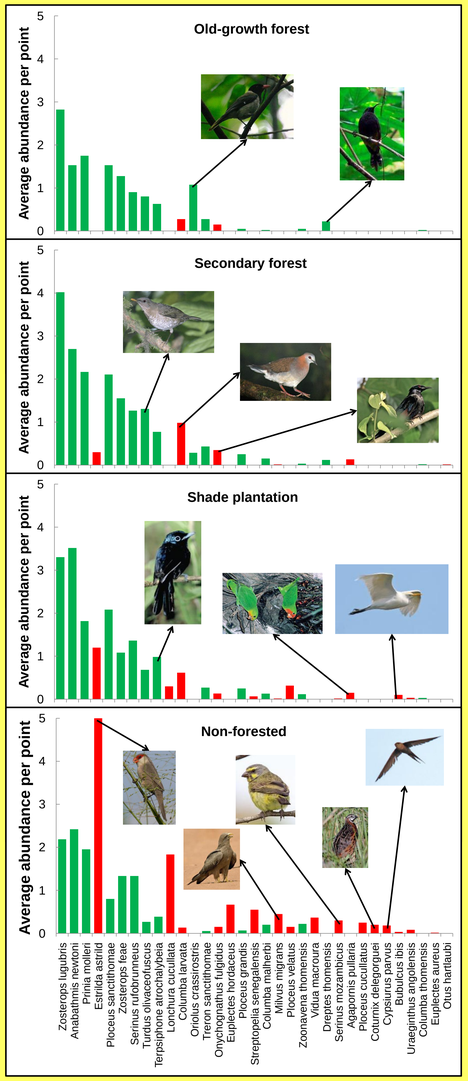
The forests of São Tomé hold three of the most endangered bird species in the world (classified as Critically Endangered by IUCN's red list).

Composition and structure

- Most endemic species occur across all land-uses, although a few disappear or decrease their abundance in more intensively used areas.
- Non-endemic birds are virtually absent from old-growth forest, but increase their numbers with land-use intensity to represent almost half of the species and individuals in the non-forested areas.
- There are differences in the community structure between all land-uses (one-way ANOSIM, $p<0.01$), except between old-growth and secondary forests.
- The drier lowlands in the Northeast are the most sensitive areas to land-use, hosting the communities with less endemisms.



Non-metric multidimensional scaling of bird community structure. Each dot represents a transect ordinated according to the abundance of all species (R^2_{axis1} = 0.937, R^2_{axis2} = 0.016) . Dots are coloured and grouped by land-use (black – old-growth; dark grey – secondary; light grey – shade; white – non-forested). Arrows represent the correlation of the main ordination axes with some environmental variables. Only significantly correlated variables are represented (Pearson product-moment correlation, $p<0.05$) and the tip of the arrows indicates the correlation value with each of the ordination axes.



Rank abundance graph of all species detected. Species were ranked according to their overall average abundance per point. Each graph shows the average abundance per point in a distinct land-use. The green bars represent the endemic species and the red ones the non-endemic. The indicator species of each land-use are highlighted.

Conservation implications

- The majority of the endemic birds are found in all forested land-uses, but in the non-forested areas these are partially replaced by widespread species.
- The favourable landscape of São Tomé, with a large proportion of forest cover remaining, means that the endemic bird species still predominate across most of the island.
- The protection of São Tomé's forests is crucial to maintain the full community of endemic birds.
- The ongoing trend to replace shade plantation by more intensive practices will also have serious deleterious effects on the distribution and abundance of the endemic birds.

Acknowledgments

This work was funded by "Fundação para a Ciência e a Tecnologia" (SFRH/BD/36812/2007) and by a Rufford Small Grant for Conservation. I am thankful to "Associação Monte Pico" and "Ministério dos Recursos Naturais, Energia e Ambiente" for their support in São Tomé. Bird pictures were taken from "The birds of São Tomé e Príncipe: a photo guide" (Leventis & Olmos 2009).